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investigated, so that the error determined by the former instrument may be translated into the error which would have been found by the latter, before the comparisons with the data of the two instruments can be combined; but this may be safely left to the Astronomer Royal, who is already engaged in the subject."

Elements of several Binary Stars. By Mr. Hind.

ξ *Böotis.*

"In Vol. VI. of the *Memoirs* of the Royal Astronomical Society, an orbit of this revolving star is given by Sir John Herschel, who founded his elements on all the observations between 1782 and 1833. On comparing this orbit with the angle observed in 1842, I found the computed position less by 16°, and accordingly attempted a correction of the elements. Adopting Sir John Herschel's numbers in the formation of equations of condition, I finally arrived at the following values, which are the best of several sets:—

Perihelion Passage 1780·43.

	° ′
Angle of Position at Perihelion	98 57
Node	6 0
Inclination to Plane of Projection	78 27
Excentricity................................	0·7508
Period of Revolution	114·8 years.

The differences between the observed and computed angles at certain selected epochs are as subjoined:—

		° ′
1782·28	comp^{d}—obs^{d}	= — 4·5
1803·25	,,	— 0·5
1822·40	,,	— 1·8
1829·43	,,	— 2·9
1838·55	,,	— 1·0
1842·30	,,	+ 1·5

"At the time of Sir W. Herschel's first observation the position would be changing rapidly, the star being near its perihelion passage. I think the excentricity is the most uncertain element.

Σ 1938 near μ *Böotis.*

"Two orbits previously calculated by me for this close binary star have already appeared in the *Monthly Notices* of the Society. The Rev. W. R. Dawes having favoured me with several sets of measures taken with his large equatoreal at Cranbrook in 1847 and 1848, I have recomputed the orbit, these later observations being of high importance in the investigation.

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"My third elements of Σ 1938 are:—

Perihelion Passage 1851·75

	° ′
Projected Perihelion	219 0
Node	104 50
Inclination	58 2
Angle between ϖ and ☊ on the orbit	103 22
Excentricity	0·8775
Semi-major axis	3″·08
Period of Revolution	458·65 years.

The maximum distance in the apparent orbit is 3″·35 at an angle of about 50°, and the least distance 0″·19 in the direction of about 200°. It is probable that the star will become single with the best telescopes in the ensuing year; the present is, therefore, an epoch of much interest, and it is to be hoped observers will not forget this object during the spring and summer.

70 *Ophiuchi.*

"I have paid close attention to the elements of this remarkable binary star, which has been signalised by Professor Mädler as exhibiting a deviation from the Newtonian law of gravitation. After repeated attempts, I arrived at the following orbit:—

Perihelion Passage 1807·48

	° ′
Node	122 14
Angle between ϖ and ☊ on the orbit	168 6
Inclination	47 20
Excentricity	0·4973
Period	88·48 years.

These numbers represent the observations tolerably well throughout, but there is still a tendency to give the angle too small between 1840 and the present time, which appears peculiar to most orbits that have yet been published.

"By Encke's method, explained in the *Berliner Jahrbuch* for 1832, I found the excentricity 0·505, and the period of revolution 86$^{\text{yrs}}$·77; the results, however, are not so satisfactory as those given above.

τ *Ophiuchi.*

"I think the orbit of this interesting star will prove something like the following:—

Perihelion Passage 1824·8

	° ′
Projected Perihelion	106
Node	130
Inclination	48 30
Excentricity	0·575
Period	104 years.

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These elements are altogether different from those published by Professor Mädler in his *Untersuchungen über die Fixtern-Systeme*, which assign an orbit deviating but slightly from a circle.

λ *Ophiuchi.*

"The elements subjoined are perfectly satisfactory. They were calculated from all the observations known to me at the close of the year 1848. The angle given by Sir W. Herschel in 1802 is altered 180°, as the only way of reconciling the whole series of positions with any supposable orbit.

Perihelion Passage 1791·214

	° ′
Position at Perihelion	177 50
Ascending Node	30 23
Inclination	49 40
Angle between π and ☊ on orbit	135 24
Excentricity	0·4772
Semi-axis major	0″·847
Period	95·88 years.

In this orbit the least apparent distance =0″·31 at an angle of about 125° and the greatest apparent distance =1″·11 at an angle of 10°. The comparison with observations shews that the errors are small considering the great difficulty attending measures of this star."

Remarks on Irradiation. By Capt. Shortrede.

With reference to the subject of irradiation brought before the Society at last meeting, Capt. Shortrede states the following facts which he observed in Western India:—

"The island of Karanja, in Bombay Harbour, was one of my stations, the summit being about 1000 feet above the sea. The top of the pillar under the dome of the Observatory at Bombay is about 70 feet above the sea, and distant from Karanja about eight miles. To observe the centre of the pillar, I had the slit of the dome turned towards Karanja, and a heliostat being outside, the sun's light was thrown upon a screen having a circular hole, five-eighths of an inch in diameter, carefully adjusted over the centre of the pillar. Viewed from Karanja, the appearance of this was a beautiful planetary disc, perfectly round, the edges being *nicely* in contact with the sides of the slit on the dome. This appearance continued unvaried for several days, and there was no sensible difference by varying the aperture of the telescope from two inches to half an inch. The slit in the dome is fifteen inches wide, and the sun's light passing through a hole of five-eighths of an inch, seemed of exactly the same size. The object *appeared* equally bright throughout, and the edges were sharp and well defined.